



1MRS 750078-ESD
Version B
Replaces version A

Issued 97-10-15
Checked P.S.
Approved S.S.

SM/SPCR ***modules*** ***for SMS 010*** ***User's Guide*** ***SMS 010 SPCR library***

Data subject to change without prior notice

Contents		Page
1	WHAT IS A SPCR MODULE ?	7
1.1	MAN/MACHINE COMMUNICATION CONVENTIONS.....	7
2	INSTALLATION.....	8
2.1	CONDITIONS FOR INSTALLATION.....	9
2.2	THE INSTALLATION BRIEFLY.....	9
3	THE MAIN MENU	10
3.1	WORKING PROCEDURE	10
3.2	SELECTING THE UNIT/RELAY.....	10
3.3	VIEWING MEASURED AND RECORDED DATA.....	12
3.4	ACQUISITION, VIEWING AND EDITING SETTINGS.....	15

CONTENTS		Page
I	THE SMS 010 CONCEPT	3
II	SM/SPCR	4
III	SUMMARY OF THIS GUIDE.....	4
IV	APPLICATION	4
V	CONDITIONS FOR USE	4
VI	COPYRIGHT	5
VII	TRADEMARKS	5
VIII	CONVENTIONS USED IN THIS GUIDE	5
IX	DESIGNATIONS AND DEFINITIONS.....	6
1	WHAT IS A SPCR MODULE ?	7
1.1	MAN/MACHINE COMMUNICATION CONVENTIONS.....	7
2	INSTALLATION.....	8
2.1	CONDITIONS FOR INSTALLATION.....	9
2.2	THE INSTALLATION BRIEFLY.....	9
3	THE MAIN MENU	10
3.1	WORKING PROCEDURE	10
3.2	SELECTING THE UNIT/RELAY.....	10
3.3	VIEWING MEASURED AND RECORDED DATA.....	12
3.4	ACQUISITION, VIEWING AND EDITING SETTINGS.....	15
3.4.1	Setting parameters.....	15
3.4.1.1	SPCR 8C19	15
3.4.1.2	SPCR 8C27	17
3.4.2	Editing measuring signals and main heading	21
3.4.3	Data acquisition.....	22
3.4.4	Editing and transferring data.....	24
3.4.5	Upload recordings (DR-COM)	25
3.4.6	Resetting of recorder.....	26
3.4.7	Erasing of all recordings	26
3.4.8	Monitor SPCR system.....	26
3.4.9	Synchronize time.....	26
A	DIRECTORIES AND FILES IN SM/SPCR	27
A.1	DISK I.....	27
A.2	HARDDISK INSTALLATION.....	28
B	SPECIFICATION OF SM/SPCR WITH SMS-BASE	29
B.1	HARDWARE REQUIREMENTS	29
B.2	APPLICATION STRUCTURE AND DATA MEMORIES.....	29
B.3	COMMUNICATION.....	29
C	SM/SPCR DISTURBANCE RECORDERS.....	30
C.1	UNIT PACKAGES AND DESIGNATIONS.....	30

I The SMS 010 concept

SMS 010 software as a whole consists of parametrisation, reporting and disturbance evaluation software. The separate software products are combined according to the needed functionality. Furthermore is communication equipment needed according to the system built-up. REPORT is also requiring a SACO 100 M or a SRIO 500 /1000 M data communicator.

The complete SMS 010 software package provides setting, reporting and disturbance evaluation facilities. The separate software products are combined according to the needs.

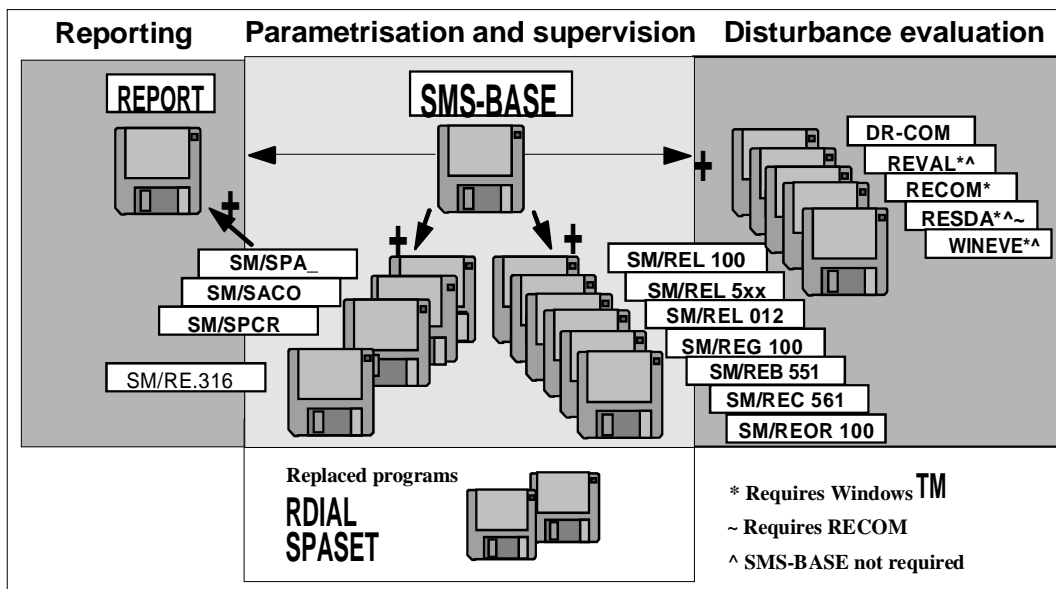


Fig. I.A SMS 010 software structure

SMS-BASE is the basic software that is always needed in order to run a SMS 010 application. It is a universal program for relays, disturbance recorders and annunciators. Other SMS 010 software modules are added to this program according to the requirements of the application. Depending on the types of protection in use, special software module/-s or programs are needed, e.g. SM/SPA_, SM/REL 100, REPORT, DR-COM, REVAL, etc

SMS 010 enables the user to call a relay via a leased line, the public telephone system or, if he is in the station, via a direct optical fibre link to read relay data, events, disturbances and change settings. SMS 010 can also be made to communicate with a PC by connecting a cable to its serial port. For example, when using a SPAC 500/300 relay, it is possible to link SPAC to the PC by connecting the SPAC control module's RS-232 front panel interface to the PC's RS-232 port using the cable supplied with the SM/SPA_ package. The data read from the SPAC can then be examined in SMS 010.

The current power system load values, recorded values and relay settings can be viewed and the settings can also be changed.

The communication between the PC and the relay is based on the SPA protocol.

With the aid of the PC, it is also possible to create a file with relay settings which only takes a few minutes to download to the protection.

II SM/SPCR

SM/SPCR, ordering number RS 881 015-AA consists of the following:

SM/SPCR	1 Disk, 1 User's Guide, 1 cable
<i>Disks</i>	
Disk 1	SM/SPCR SPCR module libraries for SMS 010
<i>User's Guides</i>	
Program Guide	SMS 010
User's Guide	SM/SPCR modules
<i>Cable</i>	
SPA-ZP 17A3	RS-232 cable (PC RS-232 serial port to the front RS-232 connector on the SPCR)

III Summary of this guide

This User's Guide instructs the user on the normal use of a SPACOM relay in conjunction with a SM/SPCR product using SMS-BASE. SMS-BASE with a SM/____ product provides the possibility of viewing the data and setting the parameters of the SPACOM series of relays using a personal computer (PC). The module data is displayed on the screen of the PC.

From a remote location, the PC communicates with the protection either via a leased line or the public telephone network, or within the same substation by a direct connection.

Examples are presented on how to view relay data and set the relay parameters. Exercises enable a quick start to be made in entering a real protection configuration and taking SMS-BASE and SM/SPCR to practical use.

IV Application

This User's Guide is applicable to SM/SPCR version 2.1.

These User's Guides describes the normal application of the software product SM/SPCR.

Reference should be made to the specific documentation for details of communication hardware and its connection. Those mentioned in this guide are only by way of example.

V Conditions for use

The information contained in this document is subject to change without notice and should not be construed as a commitment by ABB Transmit Oy, Relays & Network Control division, which also may introduce improvements and/or changes in the product(s) and/or programs described in this document at any time. ABB Transmit Oy, Relays & Network Control division assumes no responsibility for any errors that may appear in this document or in the described product(s), except as may be expressly agreed in specific documents signed by ABB Transmit Oy, Relays & Network Control division in connection with the supply of the product(s).

In no event should ABB Transmit Oy, Relays & Network Control division be liable for special, incidental or consequential damages arising from the use of this document or of the software and hardware products described in this document.

VI Copyright

This document and the enclosed software must not be reproduced or copied in part or as a whole in any form or by any means without the prior written permission of ABB Transmit Oy, Relays & Network Control division except in the following cases and for the following purposes:

- The floppy disks may be copied once for back-up purposes only.

The contents of this document and enclosed products must not be imparted to a third party nor be used for any unauthorised purpose. Contravention will be prosecuted.

Copyright © ABB Transmit Oy, Relays & Network Control division 1997

VII Trademarks

The following trademarks are used in this guide:

TRADEMARK	REGISTERED BY
SMS-BASE	ABB Transmit Oy, Relays & Network Control Division, Finland
REPORT	ABB Transmit Oy, Relays & Network Control Division, Finland
DR-COM	ABB Transmit Oy, Relays & Network Control Division, Finland
SM/SPA_	ABB Transmit Oy, Relays & Network Control Division, Finland
SM/SACO	ABB Transmit Oy, Relays & Network Control Division, Finland
SM/SPCR	ABB Transmit Oy, Relays & Network Control Division, Finland
IBM	International Business Machines Corporation
EGA	International Business Machines Corporation
VGA	International Business Machines Corporation

Additional products referred to in this User's Guide are registered trademarks of their respective manufacturers.

VIII Conventions used in this guide

The following conventions are used in this guide:

A key on the keyboard	<A>
Special keys	<up-arrow>, <down-arrow>, <left-arrow>, <right-arrow> <Home>, <End>, <PgUp>, <PgDn> <Ins>, <NumLock>, <CapsLock> <Alt>, <Ctrl> <PrintScreen>
Keys pressed at the same time	<Alt>+<F2>

Texts quoted from the screen are written in 'Quotation' marks. If the position of the text on the screen is important, the whole or part of the screen is shown. Information from the screen is shown in a frame where it is not in quotation marks.

INTRODUCTION

A part of the screen (a window) is shown as follows:

RAW SPA SRIO

The selected option in a window is bold.

A quotation of the above information would read: 'SPA'

The response by the user to a request is set in double quotation marks, e.g. "Station 1" or "009" or "xcopy C:\SMS\ /s/e a:".

An interactive dialogue between the user and the computer is sometimes listed in the same way as a script of a play. The following is an example of an interactive dialogue:

C - C:> U - C:>xcopy *.* c: C - U -
--

IX Designations and definitions

Relay	SPACOM relays
SMS 010	A system for setting of parameters, measuring, monitoring, event reporting and disturbance uploading and evaluation
SMS-BASE	The basic software needed to run SMS 010 applications
Application structure	The configuration of stations, protected units, relays and parts of relays and data storage for the relay parts for a particular application
SPA	Data bus and protocol for communication between a 'Master' and a number of 'Slaves'
Master	A unit requesting information
Slave	A unit responding to the requests from the 'Master'
Modem	Two-way converter at a signal interface
Phonemodem	Modem between RS-232 and teleline corresponding to the CCITT specification
Fibremodem	Modem for RS-232 between an electrical and a optical fibre communication link
Dataset	A block of data transferred by a relay to a PC
Filename	8 characters or less followed by an extension
Extension	3 characters or less defining the type of file
.	The 'extension' starts with '.' and is abbreviated as 'Ext'
.REC	'Ext' for acquired 'received values'
.INS	'Ext' for acquired 'installed values'
.VAL	'Ext' for observed 'validated values'
Window	A part of the screen
Default value	Value used when no other value specified
Password	Personal code entered by a user to permit him to modify relay settings
Chapter	Principal part of this guide
Section	Part of a chapter

1 WHAT IS A SPCR MODULE ?

Names of the format 'SPCR module' are abbreviations of relay module names starting with the letters SPCR (SPCR 8C19 or SPCR 8C27). SPCR module is intended to be used for verifying the proper operation of protection relays and circuit breakers and for analysing protection problems in electrical power systems. In this User's Guide, a relay module will be presented as it is used in the SMS-BASE program. For the details and technical data of a particular relay, please refer to its specific user's guide.

How to add modules and units to your SMS-BASE application structure is described in the SMS-BASE User's Guide, sections 3.2.3.7 and 3.2.3.7.1 forward.

Most of the user operations are illustrated in this guide by pictures of the screens on the PC. This enables the procedures described in the guide to be tried out and followed simultaneously on the PC screen.

Note that the screen contents can always be printed for reference using <PrintScr> or the <F7> 'report mode'.

The SMS-BASE, REPORT and DR-COM programs requires that SM/SPCR modules are installed in the application structure in order to be able to communicate with the disturbance recorder modules. SMS-BASE is containing the tools needed for working within SMS 010, while DR-COM is the program for uploading and evaluating of recordings from SPACOM disturbance recorders, (SPCR 8C19, SPCR 8C27, SPCD 2D55 and SPCD 3D53). REPORT is handling alarm, event and loggings from the modules.

1.1 Man/machine communication conventions

The screen layout and the use of some of the keys have been largely standardised. Some of the most common ones are listed below:

Key	Function
Guidance	All the SMS-BASE screens provide guidance for the operator.
Key	Available keys and their functions are stated at the bottom of the screen.
Selection	A selection from a menu is made using an <arrow key> and confirmed by pressing <Enter>.
Undo	<Esc>
Help	is displayed at the bottom of the screen.
New screen	Scroll between consecutive screens using <PgUp> and <PgDn>.

2 INSTALLATION

The basic principles for the installation of the SM/___ software packages will be shortly explained in following sections.

The installation of SM/SPCR units is easy to perform and follows the installation shown in figure 2.A. The procedure for the installation of the SMS-BASE software is thoroughly described in the SMS-BASE User's Guide, section 2.2 'Installing the program'.

When you later on need to install more relays to your SMS 010 installation from the SM/SPCR disk, you can install again and select the missing relays.

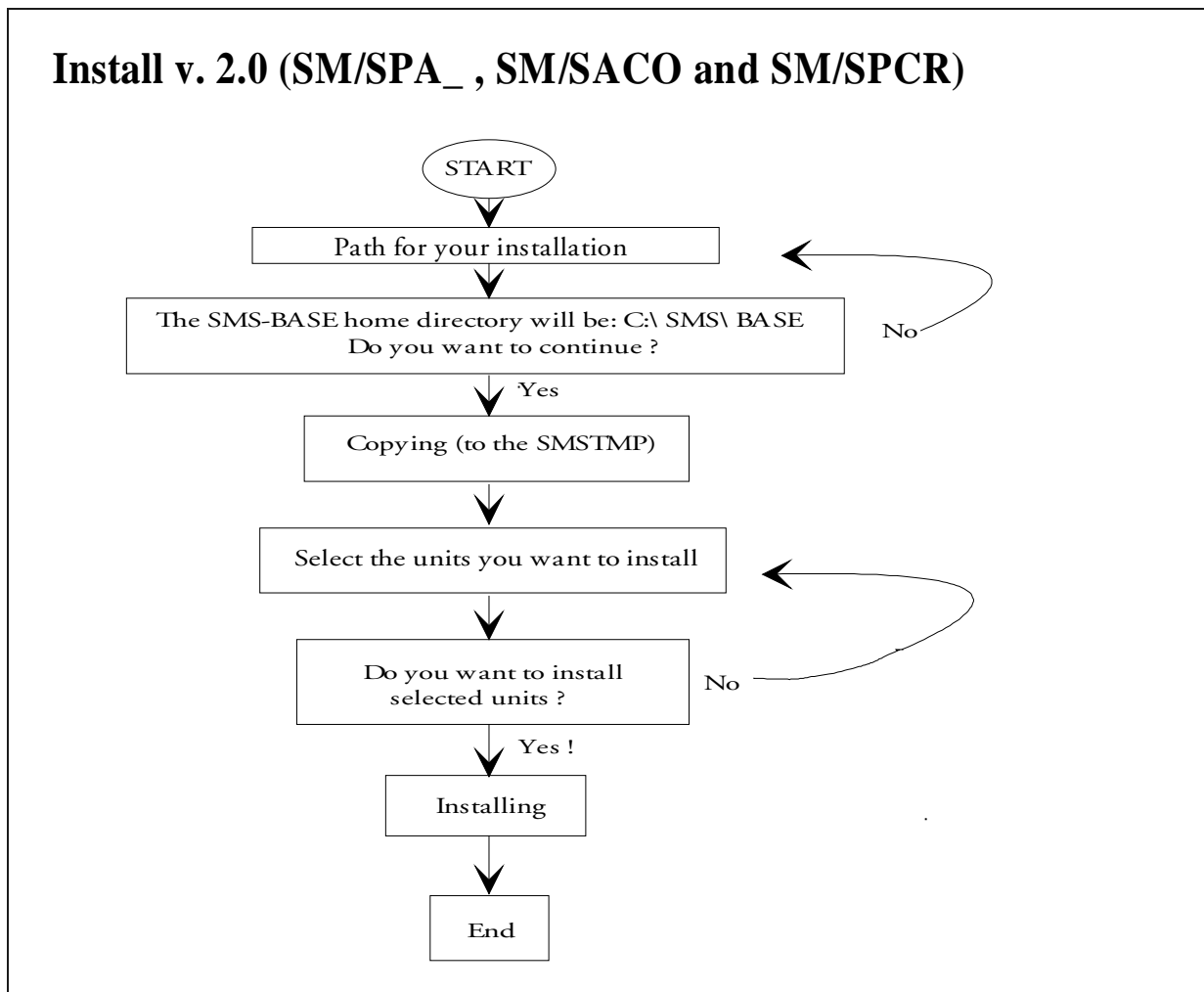


Fig. 2.A The procedure for installing SM/___ packages. SMSTMP is a temporary directory, used for installation purposes.

2.1 Conditions for installation

IMPORTANT to know before installation of SMS 010 products !

If the harddisk of the PC is defect the installation program might perform an uncompleted installation. The DOS command **CHKDSK**, (**CHKDSK/F** can repair minor faults), can be used to clarify if the harddisk is defect. **SCANDISK** is another command possible to use.

Note! SMS-BASE must always be installed before SM/SPCR !

2.2 The installation briefly

There are two starting situations for the installation:

- 1 Start totally from the beginning
- 2 An ongoing installation session, i.e. inserting of new installation disks without interrupting the installation session.

Starting situation 1:

START: (Fig 2.A)

Change drive to your floppy disk drive A: or B: etc.

Command: **A:**

At the A:\> drive type install

A:\>**install**

You will be asked for your SMS-BASE installation path.

Press <Enter> to confirm if standard path, otherwise type the correct path.

Select the units you want to install.

After finishing the relay selecting part start the actual installation is started by the <F2> button.

You could, of course, continue the installation with another disk or end the installation session by pressing <Escape>.

Starting situation 2 :

A continuous installation session means that the program queries about continuing or finishing the installation of SMS 010 software. In this case the installation program already knows the installation path for the SMS-BASE and proceeds directly to the 'Copying' (to SMSTMP). You will, though, have to select relay units as usual, when it is a SM/___ package disk. Also refer to 'Starting situation 1' and the procedure showed in Fig. 2.A.

3 THE MAIN MENU

The following procedure starts the SMS-BASE program assuming that it is already installed on the system:

C - C:\>	
U - C:\>cd SMS\BASE <Enter>	Change to the SMS-BASE directory
C - C:\SMS\BASE>	
U - C:\SMS\BASE\SMSBASE <Enter>	Start the SMS-BASE program

3.1 Working procedure

SMS-BASE in conjunction with a SM/_____ product enables the user to collect and view the data of SPACOM relays, to edit settings and download the new settings to the relay. Each of these operations is carried out according to a given procedure presented in this section.

The connection and use of a modem is described in the SMS-BASE User's Guide and therefore this manual assumes that the communication between the relay and the PC takes place in the station with the PC connected directly to the relay.

When using SMS-BASE with an SM/_____ product, the procedure for collecting and viewing data by making selections from the menus is:

1. Select 'Organization' and 'Station'.
2. Select 'Object/Bay', e.g. the switchgear bay of a protected line.
3. Select 'Unit', i.e. one of the units in the 'Object/Bay', e.g. SPAC 531 C.
4. Select 'Module'.
5. Acquire the desired data by selecting 'Receive parameters'.
6. View the data by selecting 'Edit parameters and monitor data'.

Omit step 5, if you only wish to view data which has already been acquired.

The description of the procedure for editing settings is a continuation of the procedure for viewing settings with the exception that editing is done in the part of the screen marked 'New values'. After the new settings have been saved, they have to be downloaded to the relay module by selecting 'Send and receive parameters'.

3.2 Selecting the Unit/Relay

Every data handling operation starts by selecting a relay and its module. Moving between different levels in the application structure is done with the <Enter> and <Esc> keys.

In Brief:

The standard procedure for selecting a protection unit of relay is:

1. Select 'Organization' and 'Station'.
 2. Select 'Object/Bay', e.g. the switchgear bay of a protected line.
 3. Select 'Unit', i.e. one of the units in the 'Object/Bay'.
 4. Select 'Module/Part', i.e. a module in the unit.
- Undo by pressing <Esc>.
-

The following screen appears upon starting SMS-BASE:

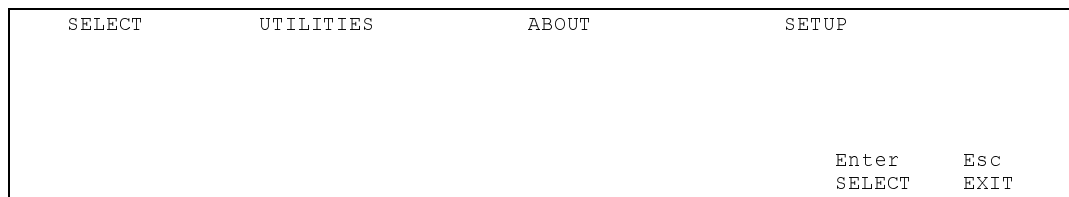


Fig. 3.2.A Basic menu for selecting a relay (SMS-BASE main menu)

The system proposes the 'SELECT' option on the top line.

1. Select 'Organization' and 'Station'

- Confirm the selection of the 'Organization' and 'Station' by pressing <Enter>.

2. Select 'Object/Bay', e.g. the switchgear bay of a protected line.

- The following box appears on the screen (this is an example application structure):

```

=====Select Object/Bay=====
Sundom
Kvevlax
Singsby
DR-COM STATION
=====

```

The names of the bays can be chosen to suit the application. They are edited by selecting 'UTILITIES' and 'Alter application structure'. The corresponding procedure is described in the SMS-BASE User's Guide. An object is selected among those listed in the box by means of the up- and downarrows.

- Confirm the selection of 'Sundom' by pressing <Enter>.

3. Select 'Unit', i.e. one of the units in the 'Object/Bay'.

- The following box appears on the screen:

```

=====Select Unit=====
SPAC 531 C Feeder terminal
=====

```

- Confirm the selection of 'SPAC 531 C ...' by pressing <Enter>.

4. Select 'Module/Part', i.e. a module in the unit.

- The following box appears on the screen:

```

=====Select Module/Part of Unit=====
SPCJ 3C3 Overcurrent module [11]
SPCS 3C4 Directional earth-fault module [12]
SPTO 6D3 Control module [99]
SPCR 8C27 Disturbance recorder [1]
=====

```

- Confirm the selection of 'SPCR 8C27 ...' by pressing <Enter>.

Note! The standard installation will not install any SPCR module in another relays. See SMS-BASE User's Guide to get more information, how modules can be added manually and inserted in other relays.

- The screen now changes to:

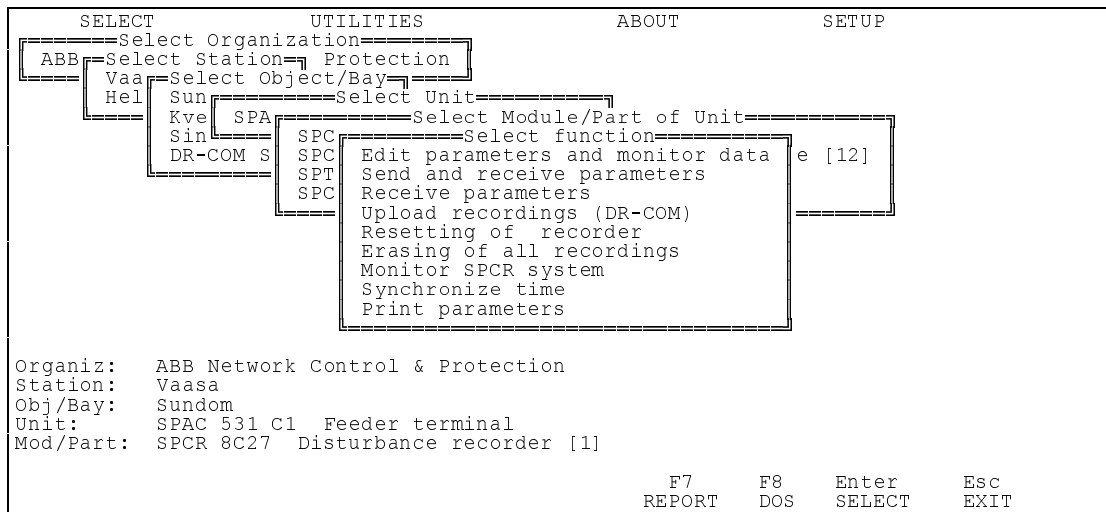


Fig. 3.2.B 'Organization', 'Station', 'Object/Bay', 'Unit' and 'Module/Part' are selected.

Eight different operations can be selected in the 'Select function' menu, of which the one at the head of the list 'Edit parameters and monitor data' will be explained first. On the screen shown in Fig. 3.2.B, the text 'Module/Part: SPCR 8C27 Disturbance recorder [1]' is in the lower half. The number '1' is the slave address used when communicating with the module. Refer to the SMS-BASE User's Guide for the procedure for changing the slave address.

3.3 Viewing measured and recorded data

Before using the viewing operation for the first time, it is recommended to first read the 'General notes'. The 'Edit parameters and monitor data' screen shows:

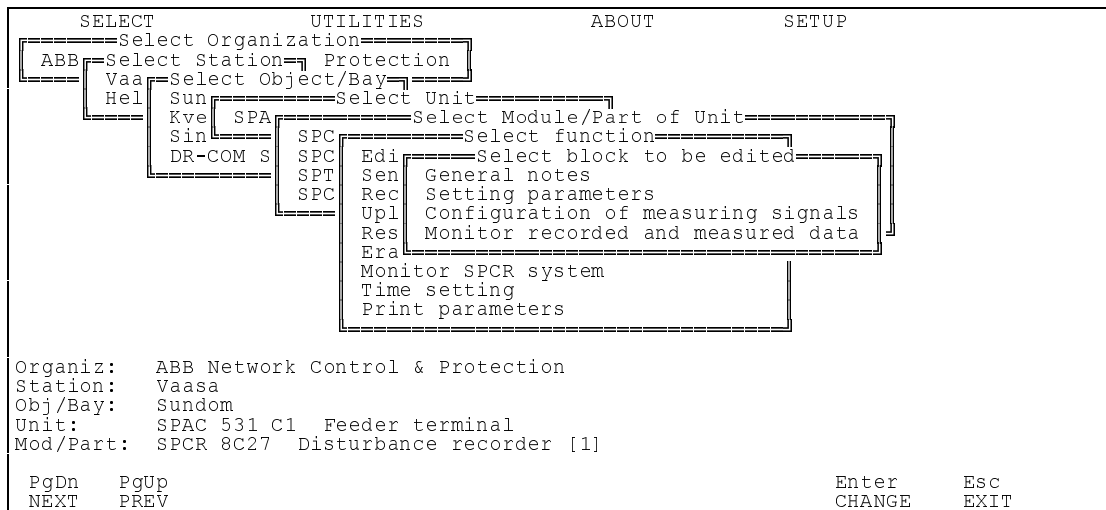


Fig. 3.3.A Select the block to be edited by marking it by the cursor and press <Enter>

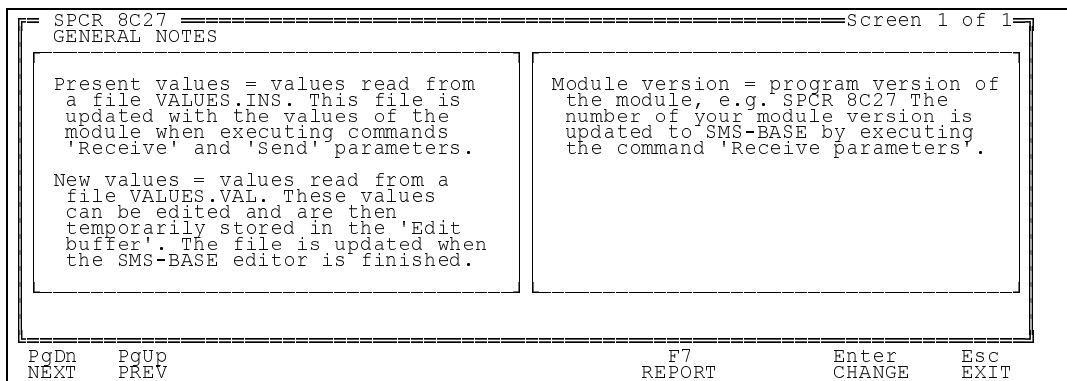


Fig. 3.3.B The contents of General notes

Once the relay module has been selected, its data can be viewed by selecting 'Monitor recorded and measured data'. The procedure for the acquisition of data from the relay will be presented later.

In Brief:

The procedure for viewing protection data is:

- 1 Select 'Edit parameters and monitor data' and wait for 3-7 s for calculation.
- 2 Select 'Monitor recorded and measured data'.
- 3 Browse through the screens by using the <PgUp> and <PgDn> keys.
- 4 Exit by pressing <Esc>.

1. Select 'Edit parameters and monitor data'.

- Select 'Edit parameters and monitor data' and confirm by pressing <Enter>.
- The screen now changes to:

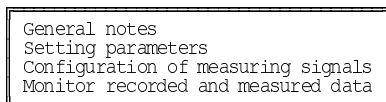


Fig. 3.3.C The 'Select block to be edited menu'

2. Select 'Monitor recorded and measured data'

- Select 'Monitor recorded and measured data'.
- For each of the three data blocks, the 'Monitor recorded and measured data' activity starts with a list of contents.
- The six 'Monitor recorded and measured data' screens are now listed:

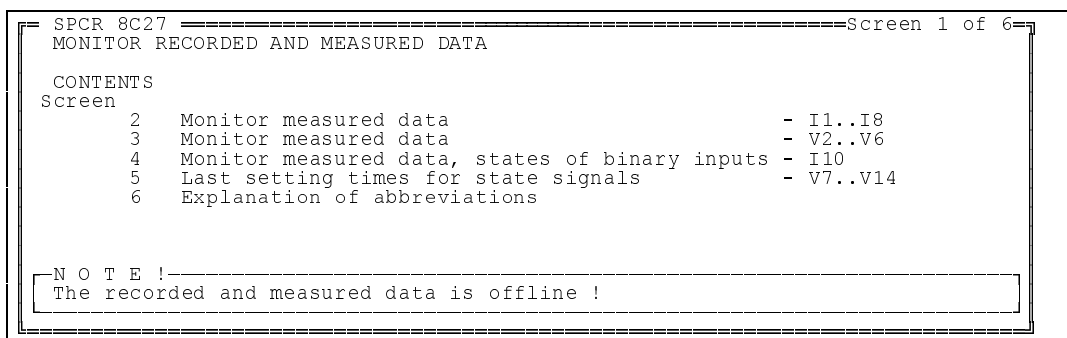


Fig. 3.3.D List of 'Monitor recorded and measured data' screens

Screen 2 displays the latest primary system and input unit values. At the time of transfer the values are less than 1 s old.

SPCR 8C27 Screen 2 of 6

Monitor measured data - I1..I8

Monitor	Measured data	Explanation
I1	= 0.0•Un = 0.0 kV	Measured value of the U12 voltage
I2	= 0.0•Un = 0.0 kV	Measured value of the U23 voltage
I3	= 0.0•Un = 0.0 kV	Measured value of the U31 voltage
I4	= 1.44•In = 0.86 kA	Measured value of the IL1 current
I5	= 1.36•In = 0.81 kA	Measured value of the IL2 current
I6	= 1.32•In = 0.79 kA	Measured value of the IL3 current
I7	= 6 %•Un = 0 kV	Measured value of the Uo voltage
I8	= 0 %•In = 0 A	Measured value of the Io current

Fig. 3.3.E Summary of primary system measured data

Screen 3 displays the minimum and maximum values and times.

SPCR 8C27 Screen 3 of 6

Monitor measured data - V2..V6

Date	Time	Values
00-00-00	00.00;00	U12min = = U23min = = U31min = =
00-00-00	00.00;00	U12max = = U23max = = U31max = =
94-07-20	14.45;33	IL1max = 4.96•In = 2.97 kA IL2max = 4.86•In = 2.89 kA IL3max = 4.82•In = 2.91 kA
00-00-00	00.00;00	Uomax = 16.6%•Un = 1.91 kV
00-00-00	00.00;00	Iomax = 20.1%•In = 14.1 A

Fig. 3.3.F Recorded values and times displayed by selecting 'Monitor recorded and measured data'

Screen 4 displays the binary input states.

SPCR 8C27 Screen 4 of 6

Monitor measured data - States of binary inputs, I10

Channel	State	Explanation
1	0	autoreclose initiation via AR2
2	0	autoreclose initiation via AR3
3	0	autoreclose initiation via AR1
4	0	autoreclose blocking and interruption via ARINH
5	0	circuit-breaker position via CBPOS
6	0	blocking signal BS1
7	0	blocking of circuit-breaker closing via CBINH
8	0	blocking signal BS2

Fig. 3.3.G States of binary inputs displayed by selecting 'Monitor recorded and measured data'

Screen 5 displays the time of activation of binary input channels 1..8.

```

=====Screen 5 of 6=====
SPCR 8C19
Last setting times for state signals - V7 .. V14

Monitor
-----
Channel                               Date       Time
-----
1. Autoreclose initiation via AR2      96-04-12  09.17;27.250
2. Autoreclose initiation via AR3      06-04-22  12.18;43.058
3. Autoreclose initiation via AR1      06-04-23  06.39;02.160
4. Autoreclose blocking and interruption via ARINH 00-00-00  00.00;00.000
5. Circuit-breaker position via CBPOS  00-00-00  00.00;00.000
6. Blocking signal BS1                 00-00-00  00.00;00.000
7. Blocking of circuit-breaker closing via CBINH 00-00-00  00.00;00.000
8. Blocking signal BS2                 00-00-00  00.00;00.000
    
```

Fig. 3.3.H Recorded data displayed by selecting 'Monitor recorded and measured data'

3 Exit by pressing <Esc>, <Enter>

- The following window is displayed upon pressing <Esc>:

```

=====Select block to be edited=====
General notes
Setting parameters
Configuration of measuring signals
Monitor recorded and measured data
    
```

Fig. 3.3.I List of the SPCR 8C27 module operations

3.4 Acquisition, viewing and editing settings

This section comprises the acquisition, viewing and editing of trigger conditions. The procedure is the same as for 'Monitor recorded and measured data'.

3.4.1 Setting parameters

3.4.1.1 SPCR 8C19

The settings for the trigger conditions U>, U<, I>, Uo and Io are displayed on screen 2 of 'Setting parameters', rated values and line frequency on screen 3, event mask on screen 4, binary input condition mask on screen 5 and length of the recordings on screen 6.

```

=====Screen 1 of 7=====
SPCR 8C19
SETTING PARAMETERS
CONTENTS
Module version: SDR403

Screen
2 Setting parameters - S2..S6
3 Rated values, line frequency - M23..25
4 Configuration of events - V155
5 Binary input condition mask - S1
6 Length of the recordings - M27
7 Explanations of abbreviations
    
```

Fig. 3.4.1.1.A Contents of the 'Setting parameters' screens for SPCR 8C19

SPCR 8C19 Binary input condition mask - S1 Screen 5 of 7

Explanation	Present values	New values
Triggering on change of signal 1, AR2	Yes 1	Yes 1
Triggering on change of signal 2, AR3	Yes 1	Yes 1
Triggering on change of signal 3, AR1	Yes 1	Yes 1
Triggering on change of signal 4, ARINH	Yes 1	Yes 1
Triggering on change of signal 5, CBPOS	Yes 1	Yes 1
Triggering on change of signal 6, BS1	Yes 1	Yes 1
Triggering on change of signal 7, CBINH	Yes 1	Yes 1
Triggering on change of signal 8, BS2	Yes 1	Yes 1

= 255 = 255

Fig. 3.4.1.1.E Settings for parameter S1

The length of the recording is defined with parameter M27, separately for each triggering. The history part of each recording has the same length for all triggerings.

SPCR 8C19 Length of the recordings - M27 Screen 7 of 7

Event-Explanation	Present values	New values
E1 = Triggering on overcurrent	0	0
E2 = Triggering on residual voltage	0	0
E3 = Triggering on neutral current	0	0
E4 = Triggering on overvoltage	0	0
E5 = Triggering on undervoltage	0	0
E6 = Triggering on change of sign.1, AR2	2	2
E7 = Triggering on change of sign.2, AR3	3	3
E8 = Triggering on change of sign.3, AR1	1	1
E9 = Triggering on change of sign.4, ARINH	0	0
E10 = Triggering on change of sign.5, CBPOS	0	0
E11 = Triggering on change of sign.6, BS1	0	0
E12 = Triggering on change of sign.7, CBINH	0	0
E13 = Triggering on change of sign.8, BS2	0	0

Recording length after trig.:

History length in blocks 1 1

Fig. 3.4.1.1.F Settings for the length of recordings in blocks

3.4.1.2 SPCR 8C27

SPCR 8C27 Screen 1 of 10

SETTING PARAMETERS

CONTENTS Module version: NDR11

Screen	Content	Parameter
2	Setting parameters	- S1..S6
3	Setting parameters	- V22,V23,M23..25,M35
4	Configuration of events	- V155
5	Selection of events that are to trig. recordings	- V24
6	Length of the recordings	- M27
7	Triggering of the binary input channels	- S10
8	Selection of channels to be monitored	- M33
9	Range selections	- M34
10	Explanations of abbreviations	

Fig. 3.4.1.2.A Contents of the 'Setting parameters' screens

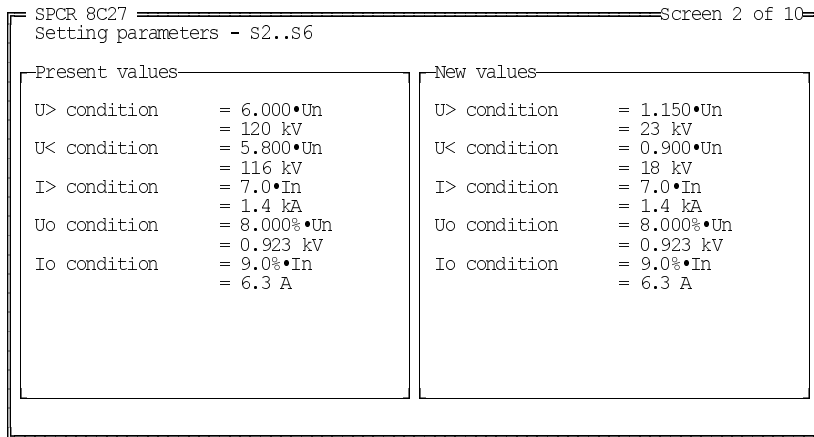


Fig.3.4.1.2.B Trigger condition settings on screen 2 of 'Setting parameters'

Editing mode is obtained by marking field to edit by the cursor, (arrow buttons), and <Enter>. Give the new value and press <Enter> to confirm or <Esc> to reject when finished. The changes made can later on be saved when leaving the 'Select block to be edited' function. You will though have to press <Esc> first to leave the setting screen activated and another <Esc> to end the editing session.

'Time interval' and 'Timer' are parameters for setting periodical triggering. If the value of the 'time interval' is 0, periodical triggering is prevented.

To be able to set the peak values, you have to know the rated values of the current and voltage transformers. These values have to be multiplied by square root 2.

When the recording resource reserver shows 'Overflow', it means that the recorder module automatically creates the necessary amount of free recording capacity by erasing the oldest recordings from the memory. The other possibility 'Saturation' means that the recorder module permits no further recordings, when the capacity of the recording memory has been fully used.

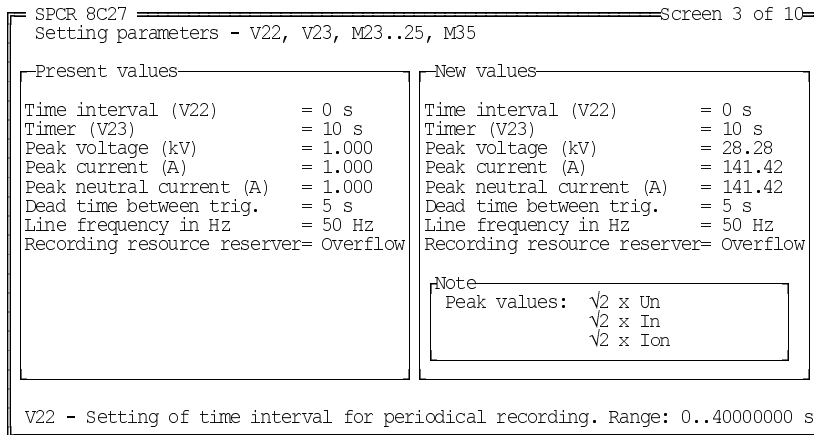


Fig. 3.4.1.2.C Settings for periodical triggering, peak values, line frequency and memory reserver.

Event 16 can not be set. It is always included in the event reporting.

SPCR 8C27 Screen 4 of 10
 Configuration of events E1..E15 - V155

Event-Explanation	Present values	New values
E1 = Triggering on overcurrent	No 0	No 0
E2 = Triggering on residual voltage	Report 1	Report 1
E3 = Triggering on neutral current	No 0	No 0
E4 = Triggering on overvoltage	No 0	No 1
E5 = Triggering on undervoltage	No 0	No 0
E6 = Triggering on change of sign.1, AR2	No 0	No 0
E7 = Triggering on change of sign.2, AR3	No 0	No 0
E8 = Triggering on change of sign.3, AR1	No 0	No 0
E9 = Triggering on change of sign.4, ARINH	No 0	No 0
E10 = Triggering on change of sign.5, CBPOS	No 0	No 0
E11 = Triggering on change of sign.6, BS1	No 0	No 0
E12 = Triggering on change of sign.7, CBINH	No 0	No 0
E13 = Triggering on change of sign.8, BS2	No 0	No 0
E14 = Manual triggering or external	No 0	No 0
E15 = Triggering on remote command	No 0	No 0
E16 = Automatic periodical triggering		
	= 2	= 10

Fig. 3.4.1.2.D Settings for event mask

Events 15 and 16 can not be set. Triggering of these events is not prevented from this parameter. If you do not want to use periodical triggering, set the value of parameter 'Time interval' (V22) to zero.

SPCR 8C27 Screen 5 of 10
 v 2.0
 Selection of events that are to trigger recordings - V24

Event-Explanation	Present values	New values
E1 = Triggering on overcurrent	No 0	No 0
E2 = Triggering on residual voltage	No 0	No 0
E3 = Triggering on neutral current	No 0	No 0
E4 = Triggering on overvoltage	No 0	No 0
E5 = Triggering on undervoltage	No 0	No 0
E6 = Triggering on change of sign.1, AR2	Yes 1	Yes 1
E7 = Triggering on change of sign.2, AR3	Yes 1	Yes 1
E8 = Triggering on change of sign.3, AR1	Yes 1	Yes 1
E9 = Triggering on change of sign.4, ARINH	No 0	No 0
E10 = Triggering on change of sign.5, CBPOS	No 0	No 0
E11 = Triggering on change of sign.6, BS1	No 0	No 0
E12 = Triggering on change of sign.7, CBINH	No 0	No 0
E13 = Triggering on change of sign.8, BS2	No 0	No 0
E14 = Manual triggering or external	No 0	No 0
E15 = Triggering on remote command	No 0	No 0
E16 = Automatic periodical triggering		
	= 112	= 112

Fig. 3.4.1.2.E Settings for trigger codes

The history part of each recording has the same length for all triggerings. History is the time before triggering. The length of the recording is defined with parameter M27, separately for each triggering

SPCR 8C27 Screen 6 of 10

Length of the recordings - M27

Event-Explanation	Recording length after trig.	
	Present values	New values
E1 = Triggering on overcurrent	0	0
E2 = Triggering on residual voltage	0	0
E3 = Triggering on neutral current	0	0
E4 = Triggering on overvoltage	0	0
E5 = Triggering on undervoltage	0	0
E6 = Triggering on change of sign.1, AR2	2	2
E7 = Triggering on change of sign.2, AR3	3	3
E8 = Triggering on change of sign.3, AR1	1	1
E9 = Triggering on change of sign.4, ARINH	0	0
E10 = Triggering on change of sign.5, CBPOS	0	0
E11 = Triggering on change of sign.6, BS1	0	0
E12 = Triggering on change of sign.7, CBINH	0	0
E13 = Triggering on change of sign.8, BS2	0	0
E14 = Manual triggering or external	0	0
E15 = Triggering on remote command	0	0
E16 = Automatic periodical triggering	0	0
History length in blocks	1	2

Fig. 3.4.1.2.F Settings for the length of recording

Note !

In Fig. 3.4.1.2.F is the total amount of blocks either 224 or 994 depending on whether the SPCR 8C27 disturbance recorder is equipped with 1 or 4 MB memory.

Triggering from a status signal can be obtained from the rising edge or the falling edge of a status signal as defined with parameter S10.

SPCR 8C27 Screen 7 of 10

Triggering of the binary input channels - S10

Channel	Present values	New values
1. AR2	Trig. on falling edge	Trig. on falling edge
2. AR3	Trig. on rising edge	Trig. on rising edge
3. AR1	Trig. on rising edge	Trig. on rising edge
4. ARINH	Trig. on falling edge	Trig. on falling edge
5. CBPOS	Trig. on rising edge	Trig. on rising edge
6. BS1	Trig. on falling edge	Trig. on falling edge
7. CBINH	Trig. on falling edge	Trig. on falling edge
8. BS2	Trig. on rising edge	Trig. on rising edge

Fig. 3.4.1.2.G Triggering of the binary input channels parameter S10

SPCR 8C27 Screen 8 of 10

Selection of channels to be monitored - M33

Channel	Present values	New values
1 = Phase-to-phase voltage U12	No 0	No 0
2 = Phase-to-phase voltage U23	No 0	No 0
3 = Phase-to-phase voltage U31	No 0	No 0
4 = Phase current IL1	Yes 1	Yes 1
5 = Phase current IL2	Yes 1	Yes 1
6 = Phase current IL3	Yes 1	Yes 1
7 = Residual voltage Uo	Yes 1	Yes 1
8 = Neutral current Io	Yes 1	Yes 1
9 = Binary channels (8)	Yes 1	Yes 1

= 504 = 504

Fig. 3.4.1.2.H Settings for monitor channels

Analog quantities, except for the residual voltage, have two selectable measuring ranges. The form of the parameter is Ix, Io, Ux.

SPCR 8C27 Screen 9 of 13

Range selections - M34

M34	Phase currents	Io current	Phase-to-phase voltages
0 0 0	0...20 x In	0...20% In	0...2.5 x Un
0 0 1	0...20 x In	0...20% In	0...21 x Un
0 1 0	0...20 x In	0...102% In	0...2.5 x Un
0 1 1	0...20 x In	0...102% In	0...21 x Un
1 0 0	0...2 x In	0...20% In	0...2.5 x Un
1 0 1	0...2 x In	0...20% In	0...21 x Un
1 1 0	0...2 x In	0...102% In	0...2.5 x Un
1 1 1	0...2 x In	0...102% In	0...21 x Un

Present values	New values	NOTE !
M34 = 0 0 0	M34 = 0 0 0	Blank separated boolean numbers (0/1). Default value: 0 0 0

M34 - Gain setting for the analog channels.

Fig. 3.4.1.2.I Gain settings for the analog channels

3.4.2 Editing measuring signals and main heading

The abbreviation used defines the heading of the various channels (= parameter M22).

The parameter 'Value type' is meaningful only, when creating a recording file (comtrade) for the Reval program. You can choose to show the Reval primary or secondary value curves.

SPCR 8C27 Screen 2 of 5

Configuration of analog channels

Channel	Name of signal	Abbreviation	Value type
1.	Phase-to-phase voltage	U12	U = Primary (kV)
2.	Phase-to-phase voltage	U23	U = Primary (kV)
3.	Phase-to-phase voltage	U31	U = Primary (kV)
4.	Phase current	I1	I = Primary (A)
5.	Phase current	I2	I = Primary (A)
6.	Phase current	I3	I = Primary (A)
7.	Residual voltage	Uo	Uo = Secondary (%Un)
8.	Neutral current	Io	Io = Primary (A)

NOTE !
Abbreviation: Do not use characters reserved by the SPA protocol ('>', '<', ':', '/', '&')

Fig. 3.4.2.A Settings for analog channels

SPCR 8C27 Screen 3 of 5

Digital channel headings

Channel	Name of signal	Abbreviation
1.	Autoreclose initiation via AR2	AR2
2.	Autoreclose initiation via AR3	AR3
3.	Autoreclose initiation via AR1	AR1
4.	Autoreclose blocking and interruption via ARINH	ARINH
5.	Circuit-breaker position via CBPOS	CBPOS
6.	Blocking signal BS1	BS1
7.	Blocking of circuit-breaker closing via CBINH	CBINH
8.	Blocking signal BS2	BS2

Fig. 3.4.2.B Settings for digital channel headings

SPCR 8C27 Screen 4 of 4

Main heading of recording

Present: VAASA

New: VAASA

NOTE !

Do not use characters reserved by the SPA protocol ('>', '<', ':', '/' and '&')

Main heading of recording.

Fig. 3.4.2.C Text for main heading

3.4.3 Data acquisition

The data acquisition procedure is the same as when using a telephone modem with a direct connection to the SPA loop. Start with a direct connection and add the extra functions for operation via a modem later on. Refer to Appendix C of the SMS-BASE User's Guide for details of connecting a modem.

In Brief:

The data acquisition procedure is:

- 1 Select 'Organization' and 'Station'.
 - 2 Select 'Object/Bay', e.g. the switchgear bay of a protected line.
 - 3 Select 'Unit', i.e. one of the units in the 'Object/Bay'.
 - 4 Select 'Module'.
 - 5 Select 'Receive parameters' to collect data, after which the PC:
 - 5.1 makes a list of variables to collect.
 - 5.2 verifies that the right relay replies.
 - 5.3 collects one variable at a time.
 - 5.4 stores the values in the file 'VALUES.INS'. Operations 1 to 4 were explained earlier in this document.
-

4. Select 'SPCR 8C27'

- The following box appears on the screen:

```

=====Select function=====
Edit parameters and monitor data
Send and receive parameters
Receive parameters
Upload recordings (DR-COM)
Resetting of recorder
Erasing of oldest recording
Monitor SPCR system
Synchronize time
Print parameters
=====

```

Fig. 3.4.3.A The functions available for SPCR 8C27

5 Select 'Receive parameters' to collect data.

- Select 'Receive parameters'.
- An automatic sequence starts which can be followed in a window on the screen.

5.1 The PC makes a list of variables to collect.

- The message 'Reading module configuration file' is displayed while the PC compiles the list.

5.2 The PC verifies that the right relay replies.

- The message 'Requesting module type' is displayed while the PC waits for the module to reply.
- This is the first time that the communication link has been used in this section. Should no communication be possible, refer to the SMS-BASE User's Guide for a step-by-step description of how to test the link to the relay module.

5.3 The PC collects one variable at a time.

- The PC displays the information on the data acquisition procedure:

```

=====
Copying values from module to file
Copying now: S4
Messages sent: 15   Retries: 0
=====

```

Fig. 3.4.3.B Reading data from the disturbance recorder over to SMS-BASE

The SPA identity for every variable is displayed, e.g. S4, the number of messages that have been sent and the number of retries so far. At a data transfer rate of 2400 bps, approx. 7 telegrams per second are transferred. The number of 'Retries' indicates the quality of the link. The PC makes three attempts to transfer a telegram and then presents the following alternatives to the user:

- '**Skip**' Omit this variable. Select this alternative, if the protection does not support a variable for some reason.
- '**Retry**' Make three more attempts.
- '**Quit**' Discontinue the operation. Select this alternative if the link does not function.

5.4 The PC stores the values in the file 'VALUES.INS'.

```

=====Select=====
Update data base with the received values . . . . . 1
Update data base but not edit values. . . . . 2
Exit without updating . . . . . 3
select action (1/2/3/): 1

```

Fig. 3.4.3.C Select function for handling the data

When alternative 1 is selected, the values of all the variables from the relay are stored in the files 'VALUES.INS' and 'VALUES.VAL'. Alternative 2 only stores them in the file 'VALUES.INS'. Since there is only one of these files for the data belonging to each relay, the existing data are overwritten by the new data.

This completes the acquisition of the 'SPCR 8C19...' module data, which can be viewed in the 'VALUES.INS' file as described earlier in this section.

3.4.4 Editing and transferring data

Settings of the 'SPCR ..' module can be changed from a remote location by using SMS-BASE. This function can be used, for example, to change trigger settings without having to travel to the station concerned or to prepare a set of new settings, which only takes a short time to download to the protection during a visit to the station.

Settings are edited in the right-hand half of the screens and correspond to the values in the 'VALUES.VAL' file.

In Brief:

The procedure for editing and transferring data is:

- 1 Select 'Edit parameters and monitor data' to change settings.
 - 2 Select 'Send and receive parameters' to transfer new settings to the relay.
 - 2.1 Enter the station password, after which the PC
 - 2.1 makes a list of variables to edit.
 - 2.2 verifies that the right relay replies.
 - 2.3 transfers one variable at a time from the 'VALUES.VAL' file.
 - 2.4 collects one variable at a time.
 - 2.5 stores the values in the 'VALUES.INS' file.
-

1 Select 'Edit parameters and monitor data' to change settings.

- Select 'Edit parameters'.
- Select the appropriate screen and the desired variable in the right-hand half by using the arrow keys.
- Start and terminate editing a value by pressing <Enter>. Press <Esc> to reject an edited value.
- Use the numerical keys to enter values and <.> as a decimal point. Confirm by pressing <Enter>.
- The permissible range is displayed on the comment line at the bottom of the screen. Values outside this range will not be accepted.
- Exit 'Edit parameters'.

2 Select 'Send and receive parameters' to transfer new settings to the relay.

- Select 'Send and receive parameters'.
- Enter the station password.

```

SMSBASE SET Password
PASSWORD CHECK BEFORE SETTING OF PROTECTION
1 Selection - Station : Vaasa
2 Please, enter the password

Version
PSWMCK P2.2

Station: Vaasa
Obj/Bay: Sundom
Unit: SPAC 531 C
Mod/Part: SPCJ 8C19 Disturbance recorder [1]
Spawning SEND-2 (C:\SMS\BASE\SUPPORT\PSWMCK.EXE)...

F8 Enter Esc
DOS SELECT EXIT

```

Fig. 3.4.4.A Give the station password !

- Enter the module password.

```

Remote setting password:

```

Fig. 3.4.4.B The remote setting password is the module password used for remote settings

- Steps 2.4 to 2.5 are the same as for data acquisition and they are performed automatically. The PC displays 'Copying values from file to module' while transmitting data and 'Copying values from module to file' while receiving data.

3.4.5 Upload recordings (DR-COM)

This function starts the DR-COM program. The program uploads (manually on demand) recordings from selected disturbance recorder and saves the recordings to files. If you want to upload recordings automatically, start the DR-COM by function key F5 on station level. See the DR-COM User's Guide to get more information.

3.4.6 Resetting of recorder

The maximum and minimum values (parameters V2..V6 and V7..V14) and recorder (warm start-up) can be reset from a remote location by SMS-BASE.

```

=====Select=====
Resetting of registers (V2..V6)
Resetting of registers (V7..V14)
Resetting of recorder - warm start-up
    
```

Fig. 3.4.6.A List of the SPCR 8C19 module operations

```

=====Select=====
Remote triggering
Resetting of registers (V2..V6)
Resetting of registers (V7..V14)
Resetting of recorder - warm start-up
    
```

Fig. 3.4.6.B List of the SPCR 8C27 module operations

3.4.7 Erasing of all recordings

The function 'Erasing of all recordings' can be used for erasing of all recordings in the memory of the recorder.

3.4.8 Monitor SPCR system

```

=====
MODULE                : SPCR 8C19 [1]
DATE/TIME RECORDER    : 94-08-04 18.00;24.620
DATE/TIME MASTER      : 94-08-04 18.00;10.081
TOTAL NUMBER OF RECORDINGS : 1
=====
ESC = EXIT
    
```

Fig. 3.4.8.A Monitoring the SPCR 8C19 module

```

=====
MODULE                : SPCR 8C27 [83]
DATE/TIME RECORDER    : 94-08-04 17.59;47.757
DATE/TIME MASTER      : 94-08-04 17.59;33.096
TOTAL NUMBER OF RECORDINGS : 5
MEASUREMENT STATUS    : Measuring mode, history collected
AVAILABLE FREE RECORDING MEMORY: 20 192 146 REC CHA BLO
=====
ESC =EXIT
    
```

Fig. 3.4.8.B Monitoring the SPCR 8C27 module

As appears from Fig. 3.4.8.B 5 recordings are stored in the disturbance recorder. 20 recordings, 192 channels and 146 blocks are available for more recordings.

3.4.9 Synchronize time

The function 'Synchronize time' is used for sending the PC time (date and time) to the recorder.

A DIRECTORIES AND FILES IN SM/SPCR

The SM/SPCR software product is delivered on a 3½" high-density (1.44 Mbyte) floppy disk. The disk contains the following:

NUMBER	DESCRIPTION
1	SM/SPCR units library

The files on the disk are compressed by using the program 'pkzip' to minimize the number of installation disks. The contents of the disk are presented below as they appear when the disk are inserted into drive A: and are viewed by using the program 'pkunzip':

A:\	Root directory of the system
\BASE\MODULES\	Descriptions
DRCOM\	Description of the DR-COM station
SPCR\	Description of disturbance recorder modules

A.1 Disk 1

Disk Nr. 1 contains:

A:\	
MODULES	Identification file
INSTALL.EXE	Installation program
INSTALL.LAN	Installation language texts
MODULES.ZIP	Archived files
DRSPCR.ZIP	Archived files
DEVICES	Module library list
PKUNZIP.EXE	File expansion program

The file 'MODULES.ZIP' contains:

\MODULES\DRCOM\	
STATION.CNF	DR-COM station configuration
STATION.DEF	DR-COM station configuration
STATION.SUP	DR-COM station configuration

\MODULES\SPCR\	
8C19.SUP	
8C19.SPT	
8C19.SET	
8C19.DEF	
8C19.CNF	
8C19_1.CNF	
8C19_2.CNF	
8C19_3.CNF	
8C27.SUP	
8C27.SPT	
8C27.SET	
8C27.DEF	
8C27.CNF	
8C27_1.CNF	
8C27_2.CNF	
8C27_3.CNF	

The file 'DRSPCR.ZIP' contains:

RELEASE	Latest news
\SUPPORT\ SPCREDIT.EXE	Starting 'EDIT.EXE'
SPCRSEND.EXE	Sending data to SPCR modules and start 'SEND.EXE'
SPCR_RX.EXE	Acquiring data from SPCR modules.
SPCRSTAT.EXE	Monitoring SPCR system
SPCRTIME.EXE	Synchronizing time
SPCRDEL.EXE	Erasing file (SPCRAPPL.DAT)
SPCRDREC.EXE	Erasing of all recordings

A.2 Harddisk installation

The system installed on the harddisk has the same directory structure as the floppy disks. The default directory created for the system is:

C:\SMS\

B SPECIFICATION OF SM/SPCR WITH SMS-BASE

The system requirements when using SM/SPCR with SMS-BASE and the typical data of SM/SPCR functions are given in this Appendix B.

B.1 Hardware requirements

The hardware requirements which have to be fulfilled for SM/SPCR and SMS-BASE to operate correctly are:

- Relay end

- SPACOM relay with an SPA communication option
- Optical fibre SPA loop with an optical fibre modem or a direct connection to the relay from the PC's serial port.

- Remote communication

- A leased line equipped with modems or a telephone modem and automatic answering function at the station.
- A public telephone network according to CCITT.
- A telephone modem that which accepts "AT" commands at the PC end.

PC

PC	IBM-AT or higher but 100% compatible. No special configuration. No special accessories for controlling serial or parallel ports.
Operating system	DOS 3.3 or higher
Main memory	500 kbyte available
Hard disk	1.5 Mbyte for SPCR modules
Display	VGA or SVGA colour display
Parallel port	1 for the printer, LPT1
Code page	437, 860, 863 or 865

B.2 Application structure and data memories

The application structure represents the actual physical structure of stations, bays and relays and enables the user to select relay and data memories of interest.

B.3 Communication

- Communication settings

- Serial port COM1, COM2
- Data transfer 300, 1200, 2400, 4800, 9600, (19200 direct via front connection) bps
- Protocol SPA, SRIO, (SACO 100M is called SRIO in SMS 010)

Note ! The baud rate 19200 should be used with consideration !

- Data transmission time at 2400 Baud

- Remote acquisition 0.15 s/variable
- Remote send 0.3 s/variable

- Time to establish a modem link 10 s typical

C SM/SPCR DISTURBANCE RECORDERS

This Appendix includes a table of existing SPCR units and their descriptions.

C.1 Unit packages and designations

```
#  
# packages file for SMS 010 installation  
#  
SPCR 8C19,Disturbance recorder:  
    SPCR 8C19,Disturbance recorder  
    *DRSPCR.ZIP  
SPCR 8C27,Disturbance recorder:  
    SPCR 8C27,Disturbance recorder  
    *DRSPCR.ZIP
```

Fig C.1.A The SPCR disturbance recorder installation list